

Amendments to the Claims:

Please replace all prior versions, and listings of claims in the application with the following listing of claims.

Listing of claims

Claim 1 (currently amended): A method in a receiver of determining a gain offset between transmission channels in a communication system, comprising the steps of:

receiving a first signal transmitted through a first channel in the communication system;

receiving a second signal transmitted through a second channel in the communication system;

deriving a first set of channel estimates from samples ~~symbols received through a first channel~~ derived from the first signal;

deriving a second set of channel estimates from samples ~~symbols received through a second channel~~ derived from the second signal; and

determining the gain offset based on the first and second sets of channel estimates, wherein each of the channel estimates is a model of a respective one of the first and second channels, and includes one or more channel tap coefficients.

Claim 2 (original): The method of claim 1, wherein the first and second channels are pilot channels.

Claim 3 (previously presented): The method of claim 1, wherein the first and second channels are a Dedicated Physical Channel (DPCH) and a Common Physical Pilot Channel (CPICH), respectively, in a Wideband Code Division Multiple Access (WCDMA) system.

Claim 4 (currently amended): A method in a receiver of determining a set of complex channel estimates for a transmission channel in a communication system, comprising the steps of:

receiving a first signal transmitted through the transmission channel;

receiving a second signal transmitted through a second transmission channel;

deriving a first set of channel estimates from ~~symbols received through the transmission channel~~ samples derived from the first signal;

deriving a second set of channel estimates from ~~symbols received through a second channel in the communication system~~ samples derived from the second signal;
determining a gain offset based on the first and second sets of channel estimates; and
determining the set of complex channel estimates based on the gain offset and the first and second sets of channel estimates,
wherein:
each of the channel estimates in the first set of channel estimates is a model of the transmission channel, and includes one or more channel tap coefficients; and
each of the channel estimates in the second set of channel estimates is a model of the second channel, and includes one or more channel tap coefficients.

Claim 5 (original): The method of claim 4, wherein the gain offset is determined using a second-order equation.

Claim 6 (currently amended): A method in a receiver of determining a set of complex channel estimates for a transmission channel in a communication system, comprising the steps of:
receiving a first signal transmitted through the transmission channel;
receiving a second signal transmitted through a second transmission channel;
deriving a first set of channel estimates from ~~symbols received through the transmission channel~~ samples derived from the first signal;
deriving a second set of channel estimates from ~~symbols received through a second channel in the communication system~~ samples derived from the second signal;
determining a gain offset based on the first and second sets of channel estimates; and
determining the set of complex channel estimates based on the gain offset and the first and second sets of channel estimates,
wherein the gain offset g^{ML} is determined using the following equation:

$$g^{ML} = -\frac{\beta}{2} + \sqrt{\frac{\beta^2}{4} + \alpha},$$

where :

$$\beta = \frac{\sum_{i=1}^n \frac{\alpha |\hat{h}_i^D|^2 - |\hat{h}_i^C|^2}{\sigma_{ei}^2}}{\sum_{i=1}^n \operatorname{Re} \left(\frac{\hat{h}_i^C \hat{h}_i^D}{\sigma_{ei}^2} \right)}$$

α is a scale factor based on a spreading factor such that $\alpha = (sf / 256)(n_D / n_C)$, where sf is the spreading factor used for [[the]] symbols of the transmission channel, 256 is the spreading factor used for [[the]] symbols of the second channel, and n_D and n_C are, respectively, the numbers of symbols coherently summed to get the first set of channel estimates \hat{h}_i^D and the second set of channel estimates \hat{h}_i^C , and σ_{ei}^2 is an estimated noise variance parameter.

Claim 7 (currently amended): The method of claim 6, wherein the complex channel estimate h_i^{ML} is determined using the following equation:

$$h_i^{ML} = \frac{\alpha \hat{h}_i^D + g^{ML} \hat{h}_i^C}{\alpha + (g^{ML})^2}$$

where: α is a scale factor based on a spreading factor such that $\alpha = (sf / 256)(n_D / n_C)$, where sf is the spreading factor used for [[the]] symbols of the transmission channel, 256 is the spreading factor used for [[the]] symbols of the second channel, and n_D and n_C are, respectively, the numbers of symbols coherently summed to get the first set of channel estimates \hat{h}_i^D and the second set of channel estimates \hat{h}_i^C .

Claim 8 (original): The method of claim 6, wherein the complex channel estimate is determined by performing a linear combination of the first and second set of channel estimates based on the gain offset.

Claim 9 (currently amended): A method in a receiver of determining a set of channel estimate gains for a transmission channel in a communication system, comprising the steps of:

receiving a first signal transmitted through the transmission channel;
receiving a second signal transmitted through a second transmission channel;
deriving a first set of channel estimates from ~~symbols received through the~~
~~transmission channel~~ samples derived from the first signal;
deriving a second set of channel estimates from ~~symbols received through a second~~
~~channel in the communication system~~ samples derived from the second signal;
determining a gain offset based on the first and second sets of channel estimates;
determining a set of channel estimate gains based on the gain offset and the first and
second sets of channel estimates; and
associating the set of channel estimate gains with channel estimate phases of one of
the first and second sets of channel estimates,
wherein:
each of the channel estimates in the first set of channel estimates is a model of the
transmission channel, and includes one or more channel tap coefficients; and
each of the channel estimates in the second set of channel estimates is a model of the
second channel, and includes one or more channel tap coefficients.

Claim 10 (original): The method of claim 9, wherein the associated channel estimate phase
is the one of the first and second sets of channel estimates being from a high-power channel.

Claim 11 (previously presented): The method of claim 10, wherein the associated channel
estimate phase is the one of the first and second sets of channel estimates being from a
Dedicated Physical Channel (DPCH) channel in a Wideband Code Division Multiple Access
(WCDMA) system.

Claim 12 (currently amended): The method of claim 4, wherein the gain offset g^{ML} is
determined using the following equation:

$$g^{ML} = -\frac{\beta}{2} + \sqrt{\frac{\beta^2}{4} + \alpha},$$

where :

$$\beta = \frac{\sum_{i=1}^n \frac{\alpha |\hat{h}_i^D|^2 - |\hat{h}_i^C|^2}{\sigma_{ei}^2}}{\sum_{i=1}^n \operatorname{Re} \left(\frac{\hat{h}_i^C \hat{h}_i^D}{\sigma_{ei}^2} \right)}$$

α is a scale factor based on a spreading factor such that $\alpha = (sf / 256)(n_D / n_C)$, where sf is the spreading factor used for [[the]] symbols of the transmission channel, 256 is the spreading factor used for [[the]] symbols of the second channel, and n_D and n_C are, respectively, the numbers of symbols coherently summed to get the first set of channel estimates \hat{h}_i^D and the second set of channel estimates \hat{h}_i^C , and σ_{ei}^2 is an estimated noise variance parameter.

Claim 13 (currently amended): The method of claim 12, wherein the complex channel estimate h_i^{ML} is determined using the following equation:

$$h_i^{ML} = \frac{\alpha \hat{h}_i^D + g^{ML} \hat{h}_i^C}{\alpha + (g^{ML})^2}$$

where: α is a scale factor based on a spreading factor such that $\alpha = (sf / 256)(n_D / n_C)$, where sf is the spreading factor used for [[the]] symbols of the transmission channel, 256 is the spreading factor used for [[the]] symbols of the second channel, and n_D and n_C are, respectively, the numbers of symbols coherently summed to get the first set of channel estimates \hat{h}_i^D and the second set of channel estimates \hat{h}_i^C .

Claim 14 (previously presented): The method of claim 12, wherein the complex channel estimate is determined by performing a linear combination of the first and second set of channel estimates based on the gain offset.

Claim 15 (new): An apparatus in a receiver for determining a gain offset between transmission channels in a communication system, the apparatus comprising:

means for receiving a first signal transmitted through a first channel in the communication system;

means for receiving a second signal transmitted through a second channel in the communication system;

means for deriving a first set of channel estimates from samples derived from the first signal;

means for deriving a second set of channel estimates from samples derived from the second signal; and

means for determining the gain offset based on the first and second sets of channel estimates,

wherein each of the channel estimates is a model of a respective one of the first and second channels, and includes one or more channel tap coefficients.

Claim 16 (new): The apparatus of claim 15, wherein the first and second channels are pilot channels.

Claim 17 (new): The apparatus of claim 15, wherein the first and second channels are a Dedicated Physical Channel (DPCH) and a Common Physical Pilot Channel (CPICH), respectively, in a Wideband Code Division Multiple Access (WCDMA) system.

Claim 18 (new): An apparatus in a receiver for determining a set of complex channel estimates for a transmission channel in a communication system, the apparatus comprising:

means for receiving a first signal transmitted through the transmission channel;

means for receiving a second signal transmitted through a second transmission channel;

means for deriving a first set of channel estimates from samples derived from the first signal;

means for deriving a second set of channel estimates from samples derived from the second signal;

means for determining a gain offset based on the first and second sets of channel estimates; and

means for determining the set of complex channel estimates based on the gain offset and the first and second sets of channel estimates,

wherein:

each of the channel estimates in the first set of channel estimates is a model of the transmission channel, and includes one or more channel tap coefficients; and

each of the channel estimates in the second set of channel estimates is a model of the second channel, and includes one or more channel tap coefficients.

Claim 19 (new): The apparatus of claim 18, wherein the gain offset is determined using a second-order equation.

Claim 20 (new): An apparatus in a receiver for determining a set of complex channel estimates for a transmission channel in a communication system, the apparatus comprising:

means for receiving a first signal transmitted through the transmission channel;

means for receiving a second signal transmitted through a second transmission channel;

means for deriving a first set of channel estimates from samples derived from the first signal;

means for deriving a second set of channel estimates from samples derived from the second signal;

means for determining a gain offset based on the first and second sets of channel estimates; and

means for determining the set of complex channel estimates based on the gain offset and the first and second sets of channel estimates,

wherein the gain offset g^{ML} is determined using the following equation:

$$g^{ML} = -\frac{\beta}{2} + \sqrt{\frac{\beta^2}{4} + \alpha},$$

where :

$$\beta = \frac{\sum_{i=1}^n \frac{\alpha |\hat{h}_i^D|^2 - |\hat{h}_i^C|^2}{\sigma_{ei}^2}}{\sum_{i=1}^n \operatorname{Re} \left(\frac{\hat{h}_i^C \hat{h}_i^D}{\sigma_{ei}^2} \right)}$$

α is a scale factor based on a spreading factor such that $\alpha = (sf / 256)(n_D / n_C)$, where sf is the spreading factor used for symbols of the transmission channel, 256 is the spreading factor used for symbols of the second channel, and n_D and n_C are, respectively, the numbers of symbols coherently summed to get the first set of channel estimates \hat{h}_i^D and the second set of channel estimates \hat{h}_i^C , and σ_{ei}^2 is an estimated noise variance parameter.

Claim 21 (new): The apparatus of claim 20, wherein the complex channel estimate h_i^{ML} is determined using the following equation:

$$h_i^{ML} = \frac{\alpha \hat{h}_i^D + g^{ML} \hat{h}_i^C}{\alpha + (g^{ML})^2}$$

where: α is a scale factor based on a spreading factor such that $\alpha = (sf / 256)(n_D / n_C)$, where sf is the spreading factor used for symbols of the transmission channel, 256 is the spreading factor used for symbols of the second channel, and n_D and n_C are, respectively, the numbers of symbols coherently summed to get the first set of channel estimates \hat{h}_i^D and the second set of channel estimates \hat{h}_i^C .

Claim 22 (new): The apparatus of claim 20, wherein the complex channel estimate is determined by performing a linear combination of the first and second set of channel estimates based on the gain offset.

Claim 23 (new): An apparatus in a receiver for determining a set of channel estimate gains for a transmission channel in a communication system, the apparatus comprising:
means for receiving a first signal transmitted through the transmission channel;

means for receiving a second signal transmitted through a second transmission channel;

means for deriving a first set of channel estimates from samples derived from the first signal;

means for deriving a second set of channel estimates from samples derived from the second signal;

means for determining a gain offset based on the first and second sets of channel estimates;

means for determining a set of channel estimate gains based on the gain offset and the first and second sets of channel estimates; and

means for associating the set of channel estimate gains with channel estimate phases of one of the first and second sets of channel estimates,

wherein:

each of the channel estimates in the first set of channel estimates is a model of the transmission channel, and includes one or more channel tap coefficients; and

each of the channel estimates in the second set of channel estimates is a model of the second channel, and includes one or more channel tap coefficients.

Claim 24 (new): The apparatus of claim 23, wherein the associated channel estimate phase is the one of the first and second sets of channel estimates being from a high-power channel.

Claim 25 (new): The apparatus of claim 24, wherein the associated channel estimate phase is the one of the first and second sets of channel estimates being from a Dedicated Physical Channel (DPCH) channel in a Wideband Code Division Multiple Access (WCDMA) system.

Claim 26 (new): The apparatus of claim 18, wherein the gain offset g^{ML} is determined using the following equation:

$$g^{ML} = -\frac{\beta}{2} + \sqrt{\frac{\beta^2}{4} + \alpha},$$

where :

$$\beta = \frac{\sum_{i=1}^n \frac{\alpha |\hat{h}_i^D|^2 - |\hat{h}_i^C|^2}{\sigma_{ei}^2}}{\sum_{i=1}^n \operatorname{Re} \left(\frac{\hat{h}_i^C \hat{h}_i^D}{\sigma_{ei}^2} \right)}$$

α is a scale factor based on a spreading factor such that $\alpha = (sf / 256)(n_D / n_C)$, where sf is the spreading factor used for symbols of the transmission channel, 256 is the spreading factor used for symbols of the second channel, and n_D and n_C are, respectively, the numbers of symbols coherently summed to get the first set of channel estimates \hat{h}_i^D and the second set of channel estimates \hat{h}_i^C , and σ_{ei}^2 is an estimated noise variance parameter.

Claim 27 (new): The apparatus of claim 26, wherein the complex channel estimate h_i^{ML} is determined using the following equation:

$$h_i^{ML} = \frac{\alpha \hat{h}_i^D + g^{ML} \hat{h}_i^C}{\alpha + (g^{ML})^2}$$

where: α is a scale factor based on a spreading factor such that $\alpha = (sf / 256)(n_D / n_C)$, where sf is the spreading factor used for symbols of the transmission channel, 256 is the spreading factor used for symbols of the second channel, and n_D and n_C are, respectively, the numbers of symbols coherently summed to get the first set of channel estimates \hat{h}_i^D and the second set of channel estimates \hat{h}_i^C .

Claim 28 (new): The apparatus of claim 26, wherein the complex channel estimate is determined by performing a linear combination of the first and second set of channel estimates based on the gain offset.